DEPARTMENT OF THE AIR FORCE
AIR FORCE INSTITUTE FOR OPERATIONAL HEALTH (AFMC)
BROOKS CITY-BASE TEXAS

31 Jul 03

MEMORANDUM FOR OO-ALC/LCD
ATTENTION: MR PITCHER

FROM: AFIOH/RSRE
2513 Kennedy Circle
Brooks City-Base TX 78235-5116

SUBJECT: Consultative Letter, IOH-RS-BR-CL-2003-0031, Cost Estimate for Sampling of C-123s for Dioxin

1. On 14 May 03, the Health Risk Assessment Branch of the AF Institute for Operational Health (AFIOH/RSRE) participated in a conference call to discuss disposition of 18 UC-123s that were likely used to spray Agent Orange during the Vietnam War. As a result of discussions with HQ AFMC/SGBB, OO-ALC/LCDP and HQ AFMC/LG, AFIOH/RSRE was requested to construct a cost estimate for wipe and soil sampling for dioxin analysis to support decision-making and ultimate disposal of these aircraft.

2. Background

a. In 1994, AFIOH/RSRE (then AL/OEMH) evaluated a C-123 aircraft located in the museum annex at Wright-Patterson AFB, OH (AL/OE-CL-1994-0203, 19 Dec 94). Museum personnel planned to restore the aircraft and staff raised concerns prior to restoration since the aircraft reportedly carried and sprayed Agent Orange to support defoliation efforts in Vietnam. Four samples were collected (3 inside, 1 under the wing); all four samples tested positive for dioxin congeners. At the time, museum staff secured the aircraft to prevent entry. The tanks and sprayers, stored at a separate location, were not sampled. AL/OEMH staff made recommendations to limit exposure to aircraft restoration personnel and allow the public to view the exterior of the plane. The recommendations would not result in the complete decontamination of the aircraft.

b. In Mar 1997, AL/OEMH provided an initial evaluation of additional C-123's stored at the Aerospace Maintenance and Regeneration Center (AMARC) at Davis-Monthan AFB in Tucson, AZ. At the time, the planes were being considered for sale. The AL/OEMH report (AL/OE-CL-1997-0053) recommended full characterization of the level of contamination in each plane prior to release. It also recommended that planes with contaminant levels that exceed risk-based cleanup criteria be fully decontaminated as a requirement for transfer. However, AL/OEMH identified several uncertainties in the analysis including unknown levels of contamination for individual planes, herbicide analysis was performed rather than dioxin analysis (which may have under-estimated the actual results), and unavailability of a state or federal reference value for allowable surface contamination.

3. Three elements were considered in constructing a cost estimate for the current request: dioxin analysis, personnel costs and other direct costs. These will be considered and discussed separately.

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a. Dioxins were common contaminants in the production of 2,4-D and 2,4,5-T, chlorophenoxy herbicides which were two of the herbicides used in a mixture called Agent Orange. The best known and most toxic of the dioxin congeners is 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD). AFIOH's environmental chemistry laboratory, AFIOH/SDC, contacted several laboratories to solicit cost estimates for the analysis of 2,3,7,8-TCDD, as well as the full dioxin congener list. We believe it more practical and wise to test any collected samples for the full congener list ($750/sample) rather than 2,3,7,8-TCDD alone ($375/sample). While this doubles the cost, it will more fully support the human health risk based decision-making for the final disposition of these planes.

b. In the 1997 report, AL/OEMH recommended a minimum of ten wipe samples per plane to characterize dioxin contamination-we continue to support that recommendation in these cost estimates. Additionally, since these planes are stored outdoors, there is some concern that any potential dioxin contamination on the planes may have migrated to the soil below. While photodegradation and volatilization from surface soils should mitigate soil concentrations of dioxins and potential exposures, we have included these as well. Therefore, we propose 10 wipe samples per plane, 2 wipe samples per sprayer unit (that held the herbicide mixture), 2 soil samples under each C-123 airplane and 2 soil samples under each sprayer unit (if applicable). Total analysis costs for the full congener list for 48 samples is $180,000 (Atch 1).

c. Personnel costs were determined based on FY03 contractor rates. Our proposed labor categories include a program manager, project manager, senior scientist, senior technician, junior technician, and mid-level administrative support. The total projected effort is 263 hours for a total cost of $16, 236 (Atch 1).

d. The majority of the other direct costs (ODCs) include typical office support such as reproduction, phone calls and shipping, as well as travel expenses, and also include an estimate for hazardous waste disposal. The cost estimate for waste disposal is $10,000 . This expense would be required to dispose of waste solvents used for sampling or decontamination, as well as any other wastes generated during the sampling efforts. The total estimate for ODCs is $15,000.

4. The total estimated cost for sampling and analysis of the C-123s at AMARC is approximately $211,000. Without better understanding the regulatory environment, as well as the expected final disposition of the aircraft (melting, burial, etc), it's difficult to know if the proposed scope of this effort is adequate to characterize any potential contamination. Additional regulatory requirements may increase the scope and cost of such efforts. We highly recommend consulting with the appropriate regulatory authorities to better predict any other requirements. We have included a list of these potential issues that might result in additional requirements/costs (Atch 2).

5. If you have any questions, please call me at DSN 240-6121, Comm (210)536-6121.

G. CORNELL LONG
Chief, Health Risk Assessment Branch

Attachment:
1. Sampling and Analysis Cost Estimate
2. Potential Issues Related to Data Quality Objectives

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SAMPLING AND ANALYSIS COST ESTIMATE

Dioxin Analysis					
Wipe Samples	**# Units**	**# Samples/Unit**	**# Samples**	**Cost/Sample**	**Extended Cost**
Aircraft	18	10	180	$750	$135,000
Sprayers	6	2	12	$750	$9,000
Soil Samples					
Aircraft	18	2	36	$750	$27,000
Sprayers	6	2	12	$750	$9,000
Total Analysis Costs					**$180,000**

Personnel Costs			
FY03 Rates			
Labor Category	**Labor Rate**	**Project Hours**	**Extended Cost**
Program Manager	$155.51	8	$1,244.08
Project Manager	$130.61	10	$1,306.10
Senior Scientist	$124.39	15	$1,865.85
Senior Technician	$63.16	120	$7,579.20
Junior Technician	$34.18	90	$3,076.20
Mid Admin	$58.23	20	$1,164.60
Total Labor Costs			**$16,236.03**
FY04 Labor Rates	(add 4% to FY03 costs)		**$16,885.47**

Other Direct Costs		
Reproduction		$100.00
Phone calls		$300.00
Shipping		$300.00
Hazardous Waste Disposal		$10,000.00
Travel (2 Trips x 2)		
	Air	$2,800.00
	Lodging (10 nights)	$1,000.00
	Rental Car	$500.00
Total Cost, ODCs		**$15,000.00**

TOTAL ESTIMATED COSTS = $211,236.03

POTENTIAL ISSUES RELATED TO DATA QUALITY OBJECTIVES

Most environmental sampling or data collection events rely on the development of data quality objectives (DQOs). DQOs are the output of a process that defines "the purpose of the data collection effort, clarifies what the data should represent to satisfy this purpose, and specify the performance requirements for the quality of information to be obtained from the data." (USEPA, *Data Quality Objectives Process for Hazardous Waste Site Investigations*, EPA/600/R-00/007, January 2000). These outputs are then used to develop and optimize a data collection design that meets performance criteria and addresses other constraints.

One of the most important aspects of the DQO process is to identify and include relevant stakeholders, such as managers, technical staff, and regulatory authorities in the planning process. There are potential pitfalls associated with not including regulatory authorities in early planning discussions preceding the proposed C-123 sampling events. We have identified a few of the potential issues that might arise if regulators are contacted only after the sampling has been accomplished. Since C-123 disposal is a unique event, it may be beneficial to engage a regulator, if only informally, to discuss these and other potential issues of interest.

1. Incomplete contaminant characterization. This cost estimate only includes sampling and analysis of dioxin congeners. It is likely there are other materials found in or on the plane that might warrant additional investigation such as pesticides, metals, radiologicals and chromates. In this case, additional samples would need to be collected.

2. Insufficient sampling design. We have identified a minimum of 10 samples per plane, plus additional soil samples. Depending on the final disposition of the planes, this might be too few, especially if the planes were to be buried and could potentially be categorized as hazardous waste. Additionally, the plan may not include the proper or sufficient number of sampling locations to characterize contamination. Again, additional samples would need to be collected.

3. Relevant cleanup reference values/health standards. If samples are collected and dioxin is detected in the samples, it is not clear what the reference value will be. The 1994 AL/OEMH report and a recent report on the characterization of particulates found in apartments after the destruction of the World Trade Center both reference a 1988 National Academy of Sciences value for surface contamination. However, this number was derived for re-entry of office workers after a fire--it is not clear how relevant this value would be for the C-123's. In short, in the absence of a reference value, a positive detection of dioxin would only confirm its presence and provide little information regarding safe disposal of the aircraft.